

SEQUENCE LISTING

<110> FIEBIG, HELMUT
NANDY, ANDREAS
CROMWELL, OLIVER

<120> DNA SEQUENCE, AND RECOMBINANT PREPARATION OF GROUP 4
MAJOR ALLERGENS FROM CEREALS

<130> MERCK-3178

<140> 10/583,089
<141> 2006-06-15

<150> PCT/EP04/013664
<151> 2004-12-01

<150> DE 10359351.9
<151> 2003-12-16

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<170> PatentIn Ver. 3.3

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caa gcc gcc gcg gcc tac gcg ccc gtg cct gcc aag gcg gac ttc 96
Gln Ala Ala Ala Ala Tyr Ala Pro Val Pro Ala Lys Ala Asp Phe
20 25 30

ctc gga tgc ctc atg aag gag ata ccg gcc cgc ctc ctc tac gcc aag 144
Leu Gly Cys Leu Met Lys Glu Ile Pro Ala Arg Leu Leu Tyr Ala Lys
35 40 45

agc tcg cct gac tac ccc acc gtg ctg gcg cag acc atc agg aac tcg 192
Ser Ser Pro Asp Tyr Pro Thr Val Leu Ala Gln Thr Ile Arg Asn Ser
50 55 60

cgg tgg tcg tcg ccg cag aac gtg aag ccg atc tac atc atc acc ccc 240
Arg Trp Ser Ser Pro Gln Asn Val Lys Pro Ile Tyr Ile Ile Thr Pro
65 70 75 80

acc aac gcc tcg cac atc cag tcc gcg gtg gtg tgc ggc cgc cg^g cac 288
Thr Asn Ala Ser His Ile Gln Ser Ala Val Val Cys Gly Arg Arg His
85 90 95

ggc atc cgc ctc cgc gtg cg	agc ggc cac gac tac gag ggc ctg	336	
Gly Ile Arg Leu Arg Val Arg Ser Gly Gly His Asp Tyr Glu Gly Leu			
100	105	110	
tcg tac cgg tct gag aaa ccc gag acg ttc gcc gtc gtc gac ctc aac		384	
Ser Tyr Arg Ser Glu Lys Pro Glu Thr Phe Ala Val Val Asp Leu Asn			
115	120	125	
aag atg cgg gca gtg tcg gtc gac ggc tac gcc cgc acg gcg tgg gtc		432	
Lys Met Arg Ala Val Ser Val Asp Gly Tyr Ala Arg Thr Ala Trp Val			
130	135	140	
gaa tcc ggc gcg cag ctc ggc gag ctc tac tac gcg atc gcc aag aac		480	
Glu Ser Gly Ala Gln Leu Gly Glu Leu Tyr Tyr Ala Ile Ala Lys Asn			
145	150	155	160
agc ccc gtg ctc gcg ttc ccg gct ggc gtc tgc ccg tcc atc ggc gtc		528	
Ser Pro Val Leu Ala Phe Pro Ala Gly Val Cys Pro Ser Ile Gly Val			
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Gly Gly Asn Phe Ala Gly Gly Phe Gly Met Leu Leu Arg Lys Tyr			
180	185	190	
ggc atc gcc gct gag aac gtc atc gac gtc aag gtg gtc gac ccc aac		624	
Gly Ile Ala Ala Glu Asn Val Ile Asp Val Lys Val Val Asp Pro Asn			
195	200	205	
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Gly Lys Leu Leu Asp Lys Ser Ser Met Ser Ala Asp His Phe Trp Ala			
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gtt agg ggc ggc gga gag agc ttt ggc atc gtc gtc tcg tgg cag		720	
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225	230	235	240
gtg aag ctc ctg ccg gtg cct ccc acc gtg acc gtg ctc aag atc ccc		768	
Val Lys Leu Leu Pro Val Pro Pro Thr Val Thr Val Leu Lys Ile Pro			
245	250	255	
aag acg gtg caa gaa ggc gcc ata gac ctc gtc aac aag tgg cag ctg		816	
Lys Thr Val Gln Glu Gly Ala Ile Asp Leu Val Asn Lys Trp Gln Leu			
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Val Gly Pro Ala Leu Pro Gly Asp Leu Met Ile Arg Ile Ile Leu Ala			
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Leu Thr Pro Leu Met Ser Ser Lys Phe Pro Glu Leu Gly Met Asn Pro			
305	310	315	320

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ctc ggc aag cag aac ctc gac gac ctc ctc aac cg aac aac acc ttc Leu Gly Lys Gln Asn Leu Asp Asp Leu Leu Asn Arg Asn Asn Thr Phe 340 345 350	1056
aaa cca ttc gcc gaa tac aag tcg gac tac gtg tac cag ccc ttc ccc Lys Pro Phe Ala Glu Tyr Lys Ser Asp Tyr Val Tyr Gln Pro Phe Pro 355 360 365	1104
aag ccc gtg tgg gag cag atc ttc ggc tgg ctt gtg aag ccc ggc gcg Lys Pro Val Trp Glu Gln Ile Phe Gly Trp Leu Val Lys Pro Gly Ala 370 375 380	1152
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gaa gcg gcg acg ccg ttc cct cac cgc cag ggc gtc ctc ttc aac atc Glu Ala Ala Thr Pro Phe Pro His Arg Gln Gly Val Leu Phe Asn Ile 405 410 415	1248
cag tac gtc aac tac tgg ttc gct gag tca gcc ggc gcg ccg ctg Gln Tyr Val Asn Tyr Trp Phe Ala Glu Ser Ala Gly Ala Ala Pro Leu 420 425 430	1296
cag tgg agc aag gac ata tac aag ttc atg gag ccg tac gtg agc aaa Gln Trp Ser Lys Asp Ile Tyr Lys Phe Met Glu Pro Tyr Val Ser Lys 435 440 445	1344
aat ccc agg cag gcg tat gcc aac tac agg gac atc gac ctt ggc agg Asn Pro Arg Gln Ala Tyr Ala Asn Tyr Arg Asp Ile Asp Leu Gly Arg 450 455 460	1392
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ggt gag aag tac ttc aag ggc aac ttc caa agg ctc gcc att acc aag Gly Glu Lys Tyr Phe Lys Gly Asn Phe Gln Arg Leu Ala Ile Thr Lys 485 490 495	1488
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35 40 45

Ser Ser Pro Asp Tyr Pro Thr Val Leu Ala Gln Thr Ile Arg Asn Ser
50 55 60

Arg Trp Ser Ser Pro Gln Asn Val Lys Pro Ile Tyr Ile Ile Thr Pro
65 70 75 80

Thr Asn Ala Ser His Ile Gln Ser Ala Val Val Cys Gly Arg Arg His
85 90 95

Gly Ile Arg Leu Arg Val Arg Ser Gly Gly His Asp Tyr Glu Gly Leu
100 105 110

Ser Tyr Arg Ser Glu Lys Pro Glu Thr Phe Ala Val Val Asp Leu Asn
115 120 125

Lys Met Arg Ala Val Ser Val Asp Gly Tyr Ala Arg Thr Ala Trp Val
130 135 140

Glu Ser Gly Ala Gln Leu Gly Glu Leu Tyr Tyr Ala Ile Ala Lys Asn
145 150 155 160

Ser Pro Val Leu Ala Phe Pro Ala Gly Val Cys Pro Ser Ile Gly Val
165 170 175

Gly Gly Asn Phe Ala Gly Gly Phe Gly Met Leu Leu Arg Lys Tyr
180 185 190

Gly Ile Ala Ala Glu Asn Val Ile Asp Val Lys Val Val Asp Pro Asn
195 200 205

Gly Lys Leu Leu Asp Lys Ser Ser Met Ser Ala Asp His Phe Trp Ala
210 215 220

Val Arg Gly Gly Gly Glu Ser Phe Gly Ile Val Val Ser Trp Gln
225 230 235 240

Val Lys Leu Leu Pro Val Pro Pro Thr Val Thr Val Leu Lys Ile Pro
245 250 255

Lys Thr Val Gln Glu Gly Ala Ile Asp Leu Val Asn Lys Trp Gln Leu
260 265 270

Val Gly Pro Ala Leu Pro Gly Asp Leu Met Ile Arg Ile Ile Leu Ala
 275 280 285
 Gly Asn Ser Ala Thr Phe Glu Ala Met Tyr Leu Gly Thr Cys Ser Thr
 290 295 300
 Leu Thr Pro Leu Met Ser Ser Lys Phe Pro Glu Leu Gly Met Asn Pro
 305 310 315 320
 Ser His Cys Asn Glu Met Ser Trp Ile Lys Ser Ile Pro Phe Ile His
 325 330 335
 Leu Gly Lys Gln Asn Leu Asp Asp Leu Leu Asn Arg Asn Asn Thr Phe
 340 345 350
 Lys Pro Phe Ala Glu Tyr Lys Ser Asp Tyr Val Tyr Gln Pro Phe Pro
 355 360 365
 Lys Pro Val Trp Glu Gln Ile Phe Gly Trp Leu Val Lys Pro Gly Ala
 370 375 380
 Gly Ile Met Ile Met Asp Pro Tyr Gly Ala Thr Ile Ser Ala Thr Pro
 385 390 395 400
 Glu Ala Ala Thr Pro Phe Pro His Arg Gln Gly Val Leu Phe Asn Ile
 405 410 415
 Gln Tyr Val Asn Tyr Trp Phe Ala Glu Ser Ala Gly Ala Ala Pro Leu
 420 425 430
 Gln Trp Ser Lys Asp Ile Tyr Lys Phe Met Glu Pro Tyr Val Ser Lys
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 Asn Pro Arg Gln Ala Tyr Ala Asn Tyr Arg Asp Ile Asp Leu Gly Arg
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 Asn Glu Val Val Asn Asp Ile Ser Thr Tyr Ser Ser Gly Lys Val Trp
 465 470 475 480
 Gly Glu Lys Tyr Phe Lys Gly Asn Phe Gln Arg Leu Ala Ile Thr Lys
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Cys His Ala Ala Val Ser Tyr Ala Ala Pro Val Pro Ala Lys Glu	
20 25 30	
gac ttc ttc gga tgc ctg gtg aag gag ata ccg gcc cgcc ctc tac	144
Asp Phe Phe Gly Cys Leu Val Lys Glu Ile Pro Ala Arg Leu Leu Tyr	
35 40 45	
gcc aag agc tcg cct gcc ttc ccc acc gtc ctg gcg cag acc atc agg	192
Ala Lys Ser Ser Pro Ala Phe Pro Thr Val Leu Ala Gln Thr Ile Arg	
50 55 60	
aac tcg cgg tgg tcg tcg ccg cag agc gtg aag ccg ctc tac atc atc	240
Asn Ser Arg Trp Ser Ser Pro Gln Ser Val Lys Pro Leu Tyr Ile Ile	
65 70 75 80	
acc ccc acc aac gcc tcc cac atc cag tcc gcg gtg gtg tgc ggc cgcc	288
Thr Pro Thr Asn Ala Ser His Ile Gln Ser Ala Val Val Cys Gly Arg	
85 90 95	
cgg cac ggc gtc cgcc atc cgcc gtg cgg agc ggc ggc cac gac tac gag	336
Arg His Gly Val Arg Ile Arg Val Arg Ser Gly Gly His Asp Tyr Glu	
100 105 110	
ggc ctg tcg tac cgg tcc gag cgcc ccc gag gcg ttc gcc gtc gtc gac	384
Gly Leu Ser Tyr Arg Ser Glu Arg Pro Glu Ala Phe Ala Val Val Asp	
115 120 125	
ctc aac aag atg cgg gcc gtg gtg gtc gac ggc aag gct cgcc acg gccc	432
Leu Asn Lys Met Arg Ala Val Val Val Asp Gly Lys Ala Arg Thr Ala	
130 135 140	
tgg gtg gac tcc ggt gcg cag ctc ggc gag ctc tac tac gcc atc gcc	480
Trp Val Asp Ser Gly Ala Gln Leu Gly Glu Leu Tyr Tyr Ala Ile Ala	
145 150 155 160	
aag aac agc ccc gtg ctc gcg ttc ccg gcc ggc gtt tgc ccg acc att	528
Lys Asn Ser Pro Val Leu Ala Phe Pro Ala Gly Val Cys Pro Thr Ile	
165 170 175	
ggt gta ggc ggc aac ttc gct ggc ggc ggc ttc ggc atg ctg ctg cgcc	576
Gly Val Gly Gly Asn Phe Ala Gly Gly Phe Gly Met Leu Leu Arg	
180 185 190	
aag tac ggc atc gcc gcc gag aac gtc atc gac gtg aag gtg gtc gac	624
Lys Tyr Gly Ile Ala Ala Glu Asn Val Ile Asp Val Lys Val Val Asp	
195 200 205	
gcc aac ggc aca ctg ctc gac aag agc tcc atg agc gcg gat cac ttc	672
Ala Asn Gly Thr Leu Leu Asp Lys Ser Ser Met Ser Ala Asp His Phe	
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Trp Ala Val Arg Gly Gly Gly Glu Ser Phe Gly Ile Val Val Ser		
225 230	235	240
tgg cag gtg aag ctc ctc ccg gtg cct ccc acc gtg acc acc gtg ttc aag		768
Trp Gln Val Lys Leu Leu Pro Val Pro Pro Thr Val Thr Val Phe Lys		
245 250	255	
atc ccc aag acg gtg caa gaa ggc gcc gta gag ctc atc aac aag tgg		816
Ile Pro Lys Thr Val Gln Glu Gly Ala Val Glu Leu Ile Asn Lys Trp		
260 265	270	
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Gln Leu Val Ala Pro Ala Leu Pro Asp Asp Leu Met Ile Arg Ile Ile		
275 280	285	
gct ttc ggc ggc acc gcc aag ttc gag gcc atg tac ctg ggc acc tgc		912
Ala Phe Gly Gly Thr Ala Lys Phe Glu Ala Met Tyr Leu Gly Thr Cys		
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aaa gcc ctg aca ccg ctg atg agc agc aga ttc ccc gag ctc ggc atg		960
Lys Ala Leu Thr Pro Leu Met Ser Ser Arg Phe Pro Glu Leu Gly Met		
305 310	315	320
aac gcc tcg cac tgc aac gag atg ccc tgg atc aag tcc gtc cca ttc		1008
Asn Ala Ser His Cys Asn Glu Met Pro Trp Ile Lys Ser Val Pro Phe		
325 330	330	335
atc cac ctt ggc aag cag gcc acc ctc tcc gac ctc ctc aac cgg aac		1056
Ile His Leu Gly Lys Gln Ala Thr Leu Ser Asp Leu Leu Asn Arg Asn		
340 345	350	
aac acc ttc aaa ccc ttc gcc gag tac aag tcg gac tac gtc tac cag		1104
Asn Thr Phe Lys Pro Phe Ala Glu Tyr Lys Ser Asp Tyr Val Tyr Gln		
355 360	365	
ccc gtc ccc aag ccc gtc tgg gcg cag atc ttc gtc tgg ctc gtc aaa		1152
Pro Val Pro Lys Pro Val Trp Ala Gln Ile Phe Val Trp Leu Val Lys		
370 375	380	
ccc ggc gcc ggg atc atg gtc atg gac ccc tac ggc gcc gcc atc agc		1200
Pro Gly Ala Gly Ile Met Val Met Asp Pro Tyr Gly Ala Ala Ile Ser		
385 390	395	400
gcc acc ccc gaa gcc gcc acg ccg ttc cct cac cgc aag gac gtc ctc		1248
Ala Thr Pro Glu Ala Ala Thr Pro Phe Pro His Arg Lys Asp Val Leu		
405 410	410	415
ttc aac atc cag tac gtc aac tac tgg ttc gac gag gca ggc ggc gcc		1296
Phe Asn Ile Gln Tyr Val Asn Tyr Trp Phe Asp Glu Ala Gly Gly Ala		
420 425	430	
gcg ccg ctg cag tgg agc aag gac atg tac agg ttc atg gag ccg tac		1344
Ala Pro Leu Gln Trp Ser Lys Asp Met Tyr Arg Phe Met Glu Pro Tyr		
435 440	445	

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Val Ser Lys Asn Pro Arg Gln Ala Tyr Ala Asn Tyr Arg Asp Ile Asp			
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ctc ggc agg aac gag gtg gtc aac gac atc tcc acc tat gcc agc ggc		1440	
Leu Gly Arg Asn Glu Val Val Asn Asp Ile Ser Thr Tyr Ala Ser Gly			
465	470	475	480
aag gtc tgg ggc gag aag tac ttc aag ggc aac ttc caa agg ctc gcc		1488	
Lys Val Trp Gly Glu Lys Tyr Phe Lys Gly Asn Phe Gln Arg Leu Ala			
485	490	495	
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Ile Thr Lys Gly Lys Val Asp Pro Gln Asp Tyr Phe Arg Asn Glu Gln			
500	505	510	
agc atc ccg ccg ctg cta ggg aag tag tagtacttt gcttgcatgg		1583	
Ser Ile Pro Pro Leu Leu Gly Lys			
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Asp Phe Phe Gly Cys Leu Val Lys Glu Ile Pro Ala Arg Leu Leu Tyr			
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Ala Lys Ser Ser Pro Ala Phe Pro Thr Val Leu Ala Gln Thr Ile Arg			
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Asn Ser Arg Trp Ser Ser Pro Gln Ser Val Lys Pro Leu Tyr Ile Ile			
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Thr Pro Thr Asn Ala Ser His Ile Gln Ser Ala Val Val Cys Gly Arg			
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Arg His Gly Val Arg Ile Arg Val Arg Ser Gly Gly His Asp Tyr Glu			
100	105	110	
Gly Leu Ser Tyr Arg Ser Glu Arg Pro Glu Ala Phe Ala Val Val Asp			
115	120	125	
Leu Asn Lys Met Arg Ala Val Val Val Asp Gly Lys Ala Arg Thr Ala			
130	135	140	

Trp Val Asp Ser Gly Ala Gln Leu Gly Glu Leu Tyr Tyr Ala Ile Ala
 145 150 155 160
 Lys Asn Ser Pro Val Leu Ala Phe Pro Ala Gly Val Cys Pro Thr Ile
 165 170 175
 Gly Val Gly Gly Asn Phe Ala Gly Gly Phe Gly Met Leu Leu Arg
 180 185 190
 Lys Tyr Gly Ile Ala Ala Glu Asn Val Ile Asp Val Lys Val Val Asp
 195 200 205
 Ala Asn Gly Thr Leu Leu Asp Lys Ser Ser Met Ser Ala Asp His Phe
 210 215 220
 Trp Ala Val Arg Gly Gly Gly Glu Ser Phe Gly Ile Val Val Ser
 225 230 235 240
 Trp Gln Val Lys Leu Leu Pro Val Pro Pro Thr Val Thr Val Phe Lys
 245 250 255
 Ile Pro Lys Thr Val Gln Glu Gly Ala Val Glu Leu Ile Asn Lys Trp
 260 265 270
 Gln Leu Val Ala Pro Ala Leu Pro Asp Asp Leu Met Ile Arg Ile Ile
 275 280 285
 Ala Phe Gly Gly Thr Ala Lys Phe Glu Ala Met Tyr Leu Gly Thr Cys
 290 295 300
 Lys Ala Leu Thr Pro Leu Met Ser Ser Arg Phe Pro Glu Leu Gly Met
 305 310 315 320
 Asn Ala Ser His Cys Asn Glu Met Pro Trp Ile Lys Ser Val Pro Phe
 325 330 335
 Ile His Leu Gly Lys Gln Ala Thr Leu Ser Asp Leu Leu Asn Arg Asn
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 Asn Thr Phe Lys Pro Phe Ala Glu Tyr Lys Ser Asp Tyr Val Tyr Gln
 355 360 365
 Pro Val Pro Lys Pro Val Trp Ala Gln Ile Phe Val Trp Leu Val Lys
 370 375 380
 Pro Gly Ala Gly Ile Met Val Met Asp Pro Tyr Gly Ala Ala Ile Ser
 385 390 395 400
 Ala Thr Pro Glu Ala Ala Thr Pro Phe Pro His Arg Lys Asp Val Leu
 405 410 415
 Phe Asn Ile Gln Tyr Val Asn Tyr Trp Phe Asp Glu Ala Gly Ala
 420 425 430
 Ala Pro Leu Gln Trp Ser Lys Asp Met Tyr Arg Phe Met Glu Pro Tyr
 435 440 445

Val Ser Lys Asn Pro Arg Gln Ala Tyr Ala Asn Tyr Arg Asp Ile Asp
 450 455 460

Leu Gly Arg Asn Glu Val Val Asn Asp Ile Ser Thr Tyr Ala Ser Gly
 465 470 475 480

Lys Val Trp Gly Glu Lys Tyr Phe Lys Gly Asn Phe Gln Arg Leu Ala
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Ser Ile Pro Pro Leu Leu Gly Lys
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His His Ala Ala Val Ser Ser Ala Gln Val Pro Ala Lys Asp Asp Phe	
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ctg gga tgc ctc gtg aag gag ata ccg gcc cgc ctc ctc ttc gcc aag	144
Leu Gly Cys Leu Val Lys Glu Ile Pro Ala Arg Leu Leu Phe Ala Lys	
35 40 45	
agc tcg cct gcc ttc ccc gcc gtc ctg gag cag acc atc agg aac tcg	192
Ser Ser Pro Ala Phe Pro Ala Val Leu Glu Gln Thr Ile Arg Asn Ser	
50 55 60	
cgg tgg tcg tcg ccg cag aac gtg aag ccg ctc tac atc atc acc ccc	240
Arg Trp Ser Ser Pro Gln Asn Val Lys Pro Leu Tyr Ile Ile Thr Pro	
65 70 75 80	
acc aac acc tcc cac atc cag tct gct gtg gtg tgc ggc cgc cgg cac	288
Thr Asn Thr Ser His Ile Gln Ser Ala Val Val Cys Gly Arg Arg His	
85 90 95	
ggc gtc cgc ctc cgc gtg cgg agc ggc ggc cac gac tac gag ggc ctg	336
Gly Val Arg Leu Arg Val Arg Ser Gly Gly His Asp Tyr Glu Gly Leu	
100 105 110	

ctt ggc aag cag gcc acc ctg gcc gac ctc ctc aac cgg aac aac acc Leu Gly Lys Gln Ala Thr Leu Ala Asp Leu Leu Asn Arg Asn Asn Thr 340	345	350	1056
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ccc aag ccc gtg tgg gag cag ctc ttc ggc tgg ctc acg aaa ccc ggc Pro Lys Pro Val Trp Glu Gln Leu Phe Gly Trp Leu Thr Lys Pro Gly 370	375	380	1152
gcg ggg atc atg gtc atg gac cca tac ggc gcc acc atc agc gcc acc Ala Gly Ile Met Val Met Asp Pro Tyr Gly Ala Thr Ile Ser Ala Thr 385	390	395	400
ccc gaa gcg gcg acg ccg ttc cct cac cgc aag ggc gtc ctc ttc aac Pro Glu Ala Ala Thr Pro Phe Pro His Arg Lys Gly Val Leu Phe Asn 405	410	415	1248
atc cag tac gtc aac tac tgg ttc gcc gag gca gcc ggc ggc ccg Ile Gln Tyr Val Asn Tyr Trp Phe Ala Glu Ala Ala Gly Ala Ala Pro 420	425	430	1296
ctg cag tgg agc aag gac att tac aaa ttc atg gag ccg ttc gtg agc Leu Gln Trp Ser Lys Asp Ile Tyr Lys Phe Met Glu Pro Phe Val Ser 435	440	445	1344
aag aac ccc agg cag gcg tac gcc aac tac agg gac atc gac ctc ggc Lys Asn Pro Arg Gln Ala Tyr Ala Asn Tyr Arg Asp Ile Asp Leu Gly 450	455	460	1392
agg aac gag gtg gtg aac gac atc tca acc tac agc agc ggc aag gtg Arg Asn Glu Val Val Asn Asp Ile Ser Thr Tyr Ser Ser Gly Lys Val 465	470	475	480
tgg ggc gag aag tac ttc aag ggc aac ttc caa agg ctc gcc atc acc Trp Gly Glu Lys Tyr Phe Lys Gly Asn Phe Gln Arg Leu Ala Ile Thr 485	490	495	1488
aag ggc aag gtg gat ccc cag gac tac ttc agg aac gag cag agc atc Lys Gly Lys Val Asp Pro Gln Asp Tyr Phe Arg Asn Glu Gln Ser Ile 500	505	510	1536
ccg ccg ctg ctg ggc aag tag tgaccgagag tcttgcatgg agattttag Pro Pro Leu Leu Gly Lys 515			1587
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Leu Gly Cys Leu Val Lys Glu Ile Pro Ala Arg Leu Leu Phe Ala Lys
 35 40 45

Ser Ser Pro Ala Phe Pro Ala Val Leu Glu Gln Thr Ile Arg Asn Ser
 50 55 60

Arg Trp Ser Ser Pro Gln Asn Val Lys Pro Leu Tyr Ile Ile Thr Pro
 65 70 75 80

Thr Asn Thr Ser His Ile Gln Ser Ala Val Val Cys Gly Arg Arg His
 85 90 95

Gly Val Arg Leu Arg Val Arg Ser Gly Gly His Asp Tyr Glu Gly Leu
 100 105 110

Ser Tyr Arg Ser Glu Arg Pro Glu Ala Phe Ala Val Val Asp Leu Asn
 115 120 125

Lys Met Arg Thr Val Leu Val Asn Glu Lys Ala Arg Thr Ala Trp Val
 130 135 140

Asp Ser Gly Ala Gln Leu Gly Glu Leu Tyr Tyr Ala Ile Ala Lys Asn
 145 150 155 160

Ser Pro Val Leu Ala Phe Pro Ala Gly Val Cys Pro Ser Ile Gly Val
 165 170 175

Gly Gly Asn Phe Ala Gly Gly Phe Gly Met Leu Leu Arg Lys Tyr
 180 185 190

Gly Ile Ala Ala Glu Asn Val Ile Asp Val Lys Leu Val Asp Ala Asn
 195 200 205

Gly Lys Leu Leu Asp Lys Ser Ser Met Ser Pro Asp His Phe Trp Ala
 210 215 220

Val Arg Gly Gly Gly Glu Ser Phe Gly Ile Val Val Ser Trp Gln
 225 230 235 240

Val Lys Leu Leu Pro Val Pro Pro Thr Val Thr Val Phe Gln Ile Pro
 245 250 255

Lys Thr Val Gln Glu Gly Ala Val Asp Leu Ile Asn Lys Trp Gln Leu
 260 265 270

Val Ala Pro Ala Leu Pro Gly Asp Ile Met Ile Arg Ile Ile Ala Met
 275 280 285

Gly Asp Lys Ala Thr Phe Glu Ala Met Tyr Leu Gly Thr Cys Lys Thr
 290 295 300

Leu Thr Pro Leu Met Ser Ser Lys Phe Pro Glu Leu Gly Met Asn Pro
 305 310 315 320
 Ser His Cys Asn Glu Met Pro Trp Ile Lys Ser Ile Pro Phe Ile His
 325 330 335
 Leu Gly Lys Gln Ala Thr Leu Ala Asp Leu Leu Asn Arg Asn Asn Thr
 340 345 350
 Phe Lys Pro Phe Ala Glu Tyr Lys Ser Asp Tyr Val Tyr Gln Pro Val
 355 360 365
 Pro Lys Pro Val Trp Glu Gln Leu Phe Gly Trp Leu Thr Lys Pro Gly
 370 375 380
 Ala Gly Ile Met Val Met Asp Pro Tyr Gly Ala Thr Ile Ser Ala Thr
 385 390 395 400
 Pro Glu Ala Ala Thr Pro Phe Pro His Arg Lys Gly Val Leu Phe Asn
 405 410 415
 Ile Gln Tyr Val Asn Tyr Trp Phe Ala Glu Ala Ala Gly Ala Ala Pro
 420 425 430
 Leu Gln Trp Ser Lys Asp Ile Tyr Lys Phe Met Glu Pro Phe Val Ser
 435 440 445
 Lys Asn Pro Arg Gln Ala Tyr Ala Asn Tyr Arg Asp Ile Asp Leu Gly
 450 455 460
 Arg Asn Glu Val Val Asn Asp Ile Ser Thr Tyr Ser Ser Gly Lys Val
 465 470 475 480
 Trp Gly Glu Lys Tyr Phe Lys Gly Asn Phe Gln Arg Leu Ala Ile Thr
 485 490 495
 Lys Gly Lys Val Asp Pro Gln Asp Tyr Phe Arg Asn Glu Gln Ser Ile
 500 505 510
 Pro Pro Leu Leu Gly Lys
 515

<210> 7
 <211> 1603
 <212> DNA
 <213> Triticum aestivum

<220>
 <221> CDS
 <222> (1) .. (1557)

<400> 7
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 Asn Tyr Arg Ala Phe Thr Leu Val Leu Leu Phe Cys Ala Leu Ser Cys
 1 5 10 15

caa gcc gcc acc tac gcg ccg gtg cct gcc aag gag gac ttc ctc Gln Ala Ala Ala Thr Tyr Ala Pro Val Pro Ala Lys Glu Asp Phe Leu	96
20 25 30	
gga tgc ctc atg aag gag ata ccg gca cgc ctc ctc tac gcc aag agc Gly Cys Leu Met Lys Glu Ile Pro Ala Arg Leu Leu Tyr Ala Lys Ser	144
35 40 45	
tcg cct gac ttc ccc acc gtc ctg gcg cag acc atc agg aac tcg cgg Ser Pro Asp Phe Pro Thr Val Leu Ala Gln Thr Ile Arg Asn Ser Arg	192
50 55 60	
tgg ttg tcg ccg cag aac gtg aag ccg ctc tac atc atc acc ccc acc Trp Leu Ser Pro Gln Asn Val Lys Pro Leu Tyr Ile Ile Thr Pro Thr	240
65 70 75 80	
aac gcc tcg cac atc cag tcc gcg gtg gtg tgc gga cgc cgg cac agc Asn Ala Ser His Ile Gln Ser Ala Val Val Cys Gly Arg Arg His Ser	288
85 90 95	
gtc cgc ctc cgc gtc cgg agc ggc ggc cac gac tac gag ggc ctg tcg Val Arg Leu Arg Val Arg Ser Gly Gly His Asp Tyr Glu Gly Leu Ser	336
100 105 110	
tac cgg tcc gag aaa ccc gag acg ttc gcc gtc gtc gac ctc aac aag Tyr Arg Ser Glu Lys Pro Glu Thr Phe Ala Val Val Asp Leu Asn Lys	384
115 120 125	
atg cgg gca gtg ttg atc gac ggc tac gcc cgc acg gcg tgg gtc gaa Met Arg Ala Val Leu Ile Asp Gly Tyr Ala Arg Thr Ala Trp Val Glu	432
130 135 140	
tcc ggc gcg cag ctc ggc gag ctc tac tac gcc atc gcg aaa aac agc Ser Gly Ala Gln Leu Gly Glu Leu Tyr Tyr Ala Ile Ala Lys Asn Ser	480
145 150 155 160	
ccc gtg ctc gcg ttc ccg gcc ggc gtc tgc ccg acc atc ggc gtc ggc Pro Val Leu Ala Phe Pro Ala Gly Val Cys Pro Thr Ile Gly Val Gly	528
165 170 175	
ggc aac ttc gca ggc ggc ttt ggc atg ctg ctg cgg aag tac ggc Gly Asn Phe Ala Gly Gly Phe Gly Met Leu Leu Arg Lys Tyr Gly	576
180 185 190	
atc gcc gcc gag aac gtc atc gac gtc aag gtg gtc gac ccc aac ggc Ile Ala Ala Glu Asn Val Ile Asp Val Lys Val Val Asp Pro Asn Gly	624
195 200 205	
aag ctt ctc gac aag agc tcc atg agc ccg gac cac ttc tgg gcc gtc Lys Leu Leu Asp Lys Ser Ser Met Ser Pro Asp His Phe Trp Ala Val	672
210 215 220	
agg ggc ggc ggc gga gag agc ttt ggc atc gtc gtg tcg tgg caa gtg Arg Gly Gly Gly Glu Ser Phe Gly Ile Val Val Ser Trp Gln Val	720
225 230 235 240	

aag ctc ctg ccg gtg cct ccc acc gtg acc gtg ttc aag atc ccc aag		768	
Lys Leu Leu Pro Val Pro Pro Thr Val Thr Val Phe Lys Ile Pro Lys			
245	250	255	
aca gtg caa gaa ggc gcc gta gac ctc gtc aac aag tgg caa ctg gtc		816	
Thr Val Gln Glu Gly Ala Val Asp Leu Val Asn Lys Trp Gln Leu Val			
260	265	270	
ggg ccg gcc ctt ccc ggc gac ctc atg atc cgc gtc atc gct gcg ggg		864	
Gly Pro Ala Leu Pro Gly Asp Leu Met Ile Arg Val Ile Ala Ala Gly			
275	280	285	
aac acc gcg aca ttc gag ggc atg tac ctg ggc acc tgc caa acc ctg		912	
Asn Thr Ala Thr Phe Glu Gly Met Tyr Leu Gly Thr Cys Gln Thr Leu			
290	295	300	
acg ccg ttg atg agc agc caa ttc ccc gag ctt ggc atg aac ccc tat		960	
Thr Pro Leu Met Ser Ser Gln Phe Pro Glu Leu Gly Met Asn Pro Tyr			
305	310	315	320
cac tgc aac gag atg ccc tgg atc aag tcc atc ccc ttc atc cac ctc		1008	
His Cys Asn Glu Met Pro Trp Ile Lys Ser Ile Pro Phe Ile His Leu			
325	330	335	
ggc aaa gag gcc agc ctg gtc gac ctc ctc aac cgg aac aac acc ttc		1056	
Gly Lys Glu Ala Ser Leu Val Asp Leu Leu Asn Arg Asn Asn Thr Phe			
340	345	350	
aag ccc ttc gcc gaa tac aag tcg gac tac gtg tac cag ccc ttc ccc		1104	
Lys Pro Phe Ala Glu Tyr Lys Ser Asp Tyr Val Tyr Gln Pro Phe Pro			
355	360	365	
aag ccc gtg tgg gag cag atc ttc ggc tgg ctc acg aag ccc ggt ggg		1152	
Lys Pro Val Trp Glu Gln Ile Phe Gly Trp Leu Thr Lys Pro Gly Gly			
370	375	380	
ggg atg atg atc atg gac cca tac ggc gcc acc atc agc gcc acc ccc		1200	
Gly Met Met Ile Met Asp Pro Tyr Gly Ala Thr Ile Ser Ala Thr Pro			
385	390	395	400
gaa gcg gcg acg ccg ttc cct cac cgc cag ggc gtt ctc ttc aac atc		1248	
Glu Ala Ala Thr Pro Phe Pro His Arg Gln Gly Val Leu Phe Asn Ile			
405	410	415	
cag tac gtc aac tac tgg ttc gcc gag gca gcc gcc ggc ccg ctg		1296	
Gln Tyr Val Asn Tyr Trp Phe Ala Glu Ala Ala Ala Ala Pro Leu			
420	425	430	
cag tgg agc aag gac atg tac aat ttc atg gag ccg tac gtg agc aag		1344	
Gln Trp Ser Lys Asp Met Tyr Asn Phe Met Glu Pro Tyr Val Ser Lys			
435	440	445	
aac ccc agg cag gcg tac gcc aac tac agg gac att gac ctc ggc agg		1392	
Asn Pro Arg Gln Ala Tyr Ala Asn Tyr Arg Asp Ile Asp Leu Gly Arg			
450	455	460	

aac gag gtg gtg aac gac atc tca acc tat agc agc ggc aag gtt tgg		1440	
Asn Glu Val Val Asn Asp Ile Ser Thr Tyr Ser Ser Gly Lys Val Trp			
465	470	475	480
ggc gag aag tac ttc aag ggc aac ttc caa agg ctc gct att acc aag		1488	
Gly Glu Lys Tyr Phe Lys Gly Asn Phe Gln Arg Leu Ala Ile Thr Lys			
485	490	495	
ggc aag gtg gat cct cag gac tac ttc agg aac gag cag agc atc ccg		1536	
Gly Lys Val Asp Pro Gln Asp Tyr Phe Arg Asn Glu Gln Ser Ile Pro			
500	505	510	
ccg ctg ctc gag aag tac tga tcgaggacct tgcatggaga ttttagtgcgt		1587	
Pro Leu Leu Glu Lys Tyr			
515			
ggttgccgtt tcacat		1603	
<210> 8			
<211> 518			
<212> PRT			
<213> Triticum aestivum			
<400> 8			
Asn Tyr Arg Ala Phe Thr Leu Val Leu Leu Phe Cys Ala Leu Ser Cys			
1	5	10	15
Gln Ala Ala Ala Thr Tyr Ala Pro Val Pro Ala Lys Glu Asp Phe Leu			
20	25	30	
Gly Cys Leu Met Lys Glu Ile Pro Ala Arg Leu Leu Tyr Ala Lys Ser			
35	40	45	
Ser Pro Asp Phe Pro Thr Val Leu Ala Gln Thr Ile Arg Asn Ser Arg			
50	55	60	
Trp Leu Ser Pro Gln Asn Val Lys Pro Leu Tyr Ile Ile Thr Pro Thr			
65	70	75	80
Asn Ala Ser His Ile Gln Ser Ala Val Val Cys Gly Arg Arg His Ser			
85	90	95	
Val Arg Leu Arg Val Arg Ser Gly Gly His Asp Tyr Glu Gly Leu Ser			
100	105	110	
Tyr Arg Ser Glu Lys Pro Glu Thr Phe Ala Val Val Asp Leu Asn Lys			
115	120	125	
Met Arg Ala Val Leu Ile Asp Gly Tyr Ala Arg Thr Ala Trp Val Glu			
130	135	140	
Ser Gly Ala Gln Leu Gly Glu Leu Tyr Tyr Ala Ile Ala Lys Asn Ser			
145	150	155	160
Pro Val Leu Ala Phe Pro Ala Gly Val Cys Pro Thr Ile Gly Val Gly			
165	170	175	

Gly Asn Phe Ala Gly Gly Phe Gly Met Leu Leu Arg Lys Tyr Gly
 180 185 190
 Ile Ala Ala Glu Asn Val Ile Asp Val Lys Val Val Asp Pro Asn Gly
 195 200 205
 Lys Leu Leu Asp Lys Ser Ser Met Ser Pro Asp His Phe Trp Ala Val
 210 215 220
 Arg Gly Gly Gly Glu Ser Phe Gly Ile Val Val Ser Trp Gln Val
 225 230 235 240
 Lys Leu Leu Pro Val Pro Pro Thr Val Thr Val Phe Lys Ile Pro Lys
 245 250 255
 Thr Val Gln Glu Gly Ala Val Asp Leu Val Asn Lys Trp Gln Leu Val
 260 265 270
 Gly Pro Ala Leu Pro Gly Asp Leu Met Ile Arg Val Ile Ala Ala Gly
 275 280 285
 Asn Thr Ala Thr Phe Glu Gly Met Tyr Leu Gly Thr Cys Gln Thr Leu
 290 295 300
 Thr Pro Leu Met Ser Ser Gln Phe Pro Glu Leu Gly Met Asn Pro Tyr
 305 310 315 320
 His Cys Asn Glu Met Pro Trp Ile Lys Ser Ile Pro Phe Ile His Leu
 325 330 335
 Gly Lys Glu Ala Ser Leu Val Asp Leu Leu Asn Arg Asn Asn Thr Phe
 340 345 350
 Lys Pro Phe Ala Glu Tyr Lys Ser Asp Tyr Val Tyr Gln Pro Phe Pro
 355 360 365
 Lys Pro Val Trp Glu Gln Ile Phe Gly Trp Leu Thr Lys Pro Gly Gly
 370 375 380
 Gly Met Met Ile Met Asp Pro Tyr Gly Ala Thr Ile Ser Ala Thr Pro
 385 390 395 400
 Glu Ala Ala Thr Pro Phe Pro His Arg Gln Gly Val Leu Phe Asn Ile
 405 410 415
 Gln Tyr Val Asn Tyr Trp Phe Ala Glu Ala Ala Ala Ala Pro Leu
 420 425 430
 Gln Trp Ser Lys Asp Met Tyr Asn Phe Met Glu Pro Tyr Val Ser Lys
 435 440 445
 Asn Pro Arg Gln Ala Tyr Ala Asn Tyr Arg Asp Ile Asp Leu Gly Arg
 450 455 460
 Asn Glu Val Val Asn Asp Ile Ser Thr Tyr Ser Ser Gly Lys Val Trp
 465 470 475 480

Gly Glu Lys Tyr Phe Lys Gly Asn Phe Gln Arg Leu Ala Ile Thr Lys
 485 490 495
 Gly Lys Val Asp Pro Gln Asp Tyr Phe Arg Asn Glu Gln Ser Ile Pro
 500 505 510
 Pro Leu Leu Glu Lys Tyr
 515

<210> 9
 <211> 1603
 <212> DNA
 <213> Triticum aestivum

<220>
 <221> CDS
 <222> (1)...(1557)

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 aac tgt agg gcc ttc gcg cag gtg ctc ctc ttc ttc gcc ttg tcc tgc 48
 Asn Cys Arg Ala Phe Ala Gln Val Leu Leu Phe Phe Ala Leu Ser Cys
 1 5 10 15

caa gcc gcc gcc acc tac gcg ccg gtg cct gcc aag gag gac ttc ctc 96
 Gln Ala Ala Ala Thr Tyr Ala Pro Val Pro Ala Lys Glu Asp Phe Leu
 20 25 30

gga tgc ctc atg aag gag ata ccg gcc cgc ctc ctc tac gcc aag agc 144
 Gly Cys Leu Met Lys Glu Ile Pro Ala Arg Leu Leu Tyr Ala Lys Ser
 35 40 45

tcg cct gac tac ccc acc gtg ctg gcg cag acc atc agg aac tcg cgg 192
 Ser Pro Asp Tyr Pro Thr Val Leu Ala Gln Thr Ile Arg Asn Ser Arg
 50 55 60

tgg tcg acg cag cag aac gtg aag ccg ctg tac atc atc acc ccc acc 240
 Trp Ser Thr Gln Gln Asn Val Lys Pro Leu Tyr Ile Ile Thr Pro Thr
 65 70 75 80

aac gcc tcc cac atc caa tcc gcg gtg gtg tgc ggc cgc cgg cac ggc 288
 Asn Ala Ser His Ile Gln Ser Ala Val Val Cys Gly Arg Arg His Gly
 85 90 95

gtc cgc ctc cgc gtg cgg agc ggc ggc cac gac tac gag ggc ctg tcg 336
 Val Arg Leu Arg Val Arg Ser Gly Gly His Asp Tyr Glu Gly Leu Ser
 100 105 110

tac cgg tcc gag aaa ccc gag acg ttc gcc gtc gtc gac ctc aac aag 384
 Tyr Arg Ser Glu Lys Pro Glu Thr Phe Ala Val Val Asp Leu Asn Lys
 115 120 125

atg cgg gca gtg gtt gtc gac ggc tac gcc cgc acg gcg tgg gtc gaa 432
 Met Arg Ala Val Val Val Asp Gly Tyr Ala Arg Thr Ala Trp Val Glu
 130 135 140

tcc ggc gcg cag ctc ggc gag ctc tac tac gcc atc gcg aag aac agc Ser Gly Ala Gln Leu Gly Glu Leu Tyr Tyr Ala Ile Ala Lys Asn Ser 145 150 155 160	480
ccc gtg ctc gcg ttc ccg gcc ggc gtc tgc ccg tcc atc ggc gtc ggc Pro Val Leu Ala Phe Pro Ala Gly Val Cys Pro Ser Ile Gly Val Gly 165 170 175	528
ggc aac ttc gca ggc ggc ttc ggc atg ctg ctg cgc aag tac ggc Gly Asn Phe Ala Gly Gly Phe Gly Met Leu Leu Arg Lys Tyr Gly 180 185 190	576
atc gcc gcc gag aac gtc atc gac gtc aag gtg gtc gac ccc gac ggc Ile Ala Ala Glu Asn Val Ile Asp Val Lys Val Val Asp Pro Asp Gly 195 200 205	624
aag ctg ctc gac aag agc tcc atg agc gcg gac cac ttc tgg gcc gtc Lys Leu Leu Asp Lys Ser Ser Met Ser Ala Asp His Phe Trp Ala Val 210 215 220	672
agg ggc ggc gga gag agc ttc ggc atc gtc gtc tcg tgg cag gtg Arg Gly Gly Gly Glu Ser Phe Gly Ile Val Val Ser Trp Gln Val 225 230 235 240	720
aag ctc atg cca gtg cct ccc acc gtc acc gtg ttt aag atc ccc aag Lys Leu Met Pro Val Pro Thr Val Thr Val Phe Lys Ile Pro Lys 245 250 255	768
acg gtg caa gaa ggc gcc gta gac ctc gtc aac aag tgg cag ctg gtc Thr Val Gln Glu Gly Ala Val Asp Leu Val Asn Lys Trp Gln Leu Val 260 265 270	816
ggg ccg gca ctt ccc ggc gac ctc atg atc cgc gtc atc gct gcc ggg Gly Pro Ala Leu Pro Gly Asp Leu Met Ile Arg Val Ile Ala Ala Gly 275 280 285	864
aac acg gcg acg ttc gag gcc ttg tac ctg ggc acc tgc aaa acc ctg Asn Thr Ala Thr Phe Glu Ala Leu Tyr Leu Gly Thr Cys Lys Thr Leu 290 295 300	912
acg ccg ctg atg agc agc caa ttc ccc gag ctt ggc atg aac ccc tat Thr Pro Leu Met Ser Ser Gln Phe Pro Glu Leu Gly Met Asn Pro Tyr 305 310 315 320	960
cac tgc aac gag atg ccc tgg atc aag tcc gtc ccc ttc atc cac ctc His Cys Asn Glu Met Pro Trp Ile Lys Ser Val Pro Phe Ile His Leu 325 330 335	1008
ggc aaa cag gct ggc ctg gac gac ctc aac cgg aac aac acc ttc Gly Lys Gln Ala Gly Leu Asp Asp Leu Leu Asn Arg Asn Asn Thr Phe 340 345 350	1056
aag ccc ttc gcc gaa tac aag tcg gac tac gtg tac cag ccc ttc ccc Lys Pro Phe Ala Glu Tyr Lys Ser Asp Tyr Val Tyr Gln Pro Phe Pro 355 360 365	1104

aag ccc gtg tgg gag cag atc ttc ggc tgg ctc gcg aag ccc ggc gcg Lys Pro Val Trp Glu Gln Ile Phe Gly Trp Leu Ala Lys Pro Gly Ala 370 375 380	1152
ggg atc atg atc atg gac ccc tac ggc gcc acc atc agc gcc acc ccc Gly Ile Met Ile Met Asp Pro Tyr Gly Ala Thr Ile Ser Ala Thr Pro 385 390 395 400	1200
gaa gcg gcg acg ccg ttc cct cac cgc cag ggc gtc ctc ttc aac atc Glu Ala Ala Thr Pro Phe Pro His Arg Gln Gly Val Leu Phe Asn Ile 405 410 415	1248
cag tat gtc aac tac tgg ttc gcc gag cca gcc ggc gcc gcg ccg ctg Gln Tyr Val Asn Tyr Trp Phe Ala Glu Pro Ala Gly Ala Ala Pro Leu 420 425 430	1296
cag tgg agc aag gac att tac aat ttc atg gag ccg tac gtg agc aag Gln Trp Ser Lys Asp Ile Tyr Asn Phe Met Glu Pro Tyr Val Ser Lys 435 440 445	1344
aac ccc agg cag gcg tac gcc aac tac agg gac atc gac ctc ggc agg Asn Pro Arg Gln Ala Tyr Ala Asn Tyr Arg Asp Ile Asp Leu Gly Arg 450 455 460	1392
aat gag gtg gtg aac gac atc tca acc tac agc agc ggc aag gtg tgg Asn Glu Val Val Asn Asp Ile Ser Thr Tyr Ser Ser Gly Lys Val Trp 465 470 475 480	1440
ggc gag aag tac ttc aag agc aac ttc caa agg ctc gcc att acc aag Gly Glu Lys Tyr Phe Lys Ser Asn Phe Gln Arg Leu Ala Ile Thr Lys 485 490 495	1488
ggc aag gta gat cct cag gac tac ttc agg aat gag caa agc atc ccg Gly Lys Val Asp Pro Gln Asp Tyr Phe Arg Asn Glu Gln Ser Ile Pro 500 505 510	1536
ccg ctg atc gag aag tac tga tcgaggacct tgcatggaga ttttagtgct Pro Leu Ile Glu Lys Tyr 515	1587
ggttggcggtt tcacat	1603
<210> 10	
<211> 518	
<212> PRT	
<213> Triticum aestivum	
<400> 10	
Asn Cys Arg Ala Phe Ala Gln Val Leu Leu Phe Phe Ala Leu Ser Cys 1 5 10 15	
Gln Ala Ala Ala Thr Tyr Ala Pro Val Pro Ala Lys Glu Asp Phe Leu 20 25 30	
Gly Cys Leu Met Lys Glu Ile Pro Ala Arg Leu Leu Tyr Ala Lys Ser 35 40 45	

Ser Pro Asp Tyr Pro Thr Val Leu Ala Gln Thr Ile Arg Asn Ser Arg
 50 55 60

Trp Ser Thr Gln Gln Asn Val Lys Pro Leu Tyr Ile Ile Thr Pro Thr
 65 70 75 80

Asn Ala Ser His Ile Gln Ser Ala Val Val Cys Gly Arg Arg His Gly
 85 90 95

Val Arg Leu Arg Val Arg Ser Gly Gly His Asp Tyr Glu Gly Leu Ser
 100 105 110

Tyr Arg Ser Glu Lys Pro Glu Thr Phe Ala Val Val Asp Leu Asn Lys
 115 120 125

Met Arg Ala Val Val Val Asp Gly Tyr Ala Arg Thr Ala Trp Val Glu
 130 135 140

Ser Gly Ala Gln Leu Gly Glu Leu Tyr Tyr Ala Ile Ala Lys Asn Ser
 145 150 155 160

Pro Val Leu Ala Phe Pro Ala Gly Val Cys Pro Ser Ile Gly Val Gly
 165 170 175

Gly Asn Phe Ala Gly Gly Phe Gly Met Leu Leu Arg Lys Tyr Gly
 180 185 190

Ile Ala Ala Glu Asn Val Ile Asp Val Lys Val Val Asp Pro Asp Gly
 195 200 205

Lys Leu Leu Asp Lys Ser Ser Met Ser Ala Asp His Phe Trp Ala Val
 210 215 220

Arg Gly Gly Gly Glu Ser Phe Gly Ile Val Val Ser Trp Gln Val
 225 230 235 240

Lys Leu Met Pro Val Pro Pro Thr Val Thr Val Phe Lys Ile Pro Lys
 245 250 255

Thr Val Gln Glu Gly Ala Val Asp Leu Val Asn Lys Trp Gln Leu Val
 260 265 270

Gly Pro Ala Leu Pro Gly Asp Leu Met Ile Arg Val Ile Ala Ala Gly
 275 280 285

Asn Thr Ala Thr Phe Glu Ala Leu Tyr Leu Gly Thr Cys Lys Thr Leu
 290 295 300

Thr Pro Leu Met Ser Ser Gln Phe Pro Glu Leu Gly Met Asn Pro Tyr
 305 310 315 320

His Cys Asn Glu Met Pro Trp Ile Lys Ser Val Pro Phe Ile His Leu
 325 330 335

Gly Lys Gln Ala Gly Leu Asp Asp Leu Leu Asn Arg Asn Asn Thr Phe
 340 345 350

Lys Pro Phe Ala Glu Tyr Lys Ser Asp Tyr Val Tyr Gln Pro Phe Pro
 355 360 365
 Lys Pro Val Trp Glu Gln Ile Phe Gly Trp Leu Ala Lys Pro Gly Ala
 370 375 380
 Gly Ile Met Ile Met Asp Pro Tyr Gly Ala Thr Ile Ser Ala Thr Pro
 385 390 395 400
 Glu Ala Ala Thr Pro Phe Pro His Arg Gln Gly Val Leu Phe Asn Ile
 405 410 415
 Gln Tyr Val Asn Tyr Trp Phe Ala Glu Pro Ala Gly Ala Ala Pro Leu
 420 425 430
 Gln Trp Ser Lys Asp Ile Tyr Asn Phe Met Glu Pro Tyr Val Ser Lys
 435 440 445
 Asn Pro Arg Gln Ala Tyr Ala Asn Tyr Arg Asp Ile Asp Leu Gly Arg
 450 455 460
 Asn Glu Val Val Asn Asp Ile Ser Thr Tyr Ser Ser Gly Lys Val Trp
 465 470 475 480
 Gly Glu Lys Tyr Phe Lys Ser Asn Phe Gln Arg Leu Ala Ile Thr Lys
 485 490 495
 Gly Lys Val Asp Pro Gln Asp Tyr Phe Arg Asn Glu Gln Ser Ile Pro
 500 505 510
 Pro Leu Ile Glu Lys Tyr
 515

<210> 11
 <211> 1503
 <212> DNA
 <213> Phleum pratense

<220>
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 <222> (1)...(1503)

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 Tyr Phe Pro Pro Ala Ala Lys Glu Asp Phe Leu Gly Cys Leu Val
 1 5 10 15
 aaa gaa atc ccg ccg cgt ctg ttg tac gcg aaa tcg tcg ccg gcg tat 96
 Lys Glu Ile Pro Pro Arg Leu Leu Tyr Ala Lys Ser Ser Pro Ala Tyr
 20 25 30
 ccc tca gtc ctg ggg cag acc atc cg aac tcg agg tgg tcg tcg ccg 144
 Pro Ser Val Leu Gly Gln Thr Ile Arg Asn Ser Arg Trp Ser Ser Pro
 35 40 45

gac aac gtg aag ccg ctc tac atc atc acc ccc acc aac gtc tcc cac		192	
Asp Asn Val Lys Pro Leu Tyr Ile Ile Thr Pro Thr Asn Val Ser His			
50	55	60	
atc cag tcc gcc gtg gtg tgc ggc cgc cgc cac agc gtc cgc atc cgc		240	
Ile Gln Ser Ala Val Val Cys Gly Arg Arg His Ser Val Arg Ile Arg			
65	70	75	80
gtg cgc agc ggc ggg cac gac tac gag ggc ctc tcg tac cgg tct ttg		288	
Val Arg Ser Gly Gly His Asp Tyr Glu Gly Leu Ser Tyr Arg Ser Leu			
85	90	95	
cag ccc gag acg ttc gcc gtc gtc gac ctc aac aag atg cgg gcg gtg		336	
Gln Pro Glu Thr Phe Ala Val Val Asp Leu Asn Lys Met Arg Ala Val			
100	105	110	
tgg gtg gac ggc aag gcc cgc acg gcg tgg gtg gac tcc ggc gcg cag		384	
Trp Val Asp Gly Lys Ala Arg Thr Ala Trp Val Asp Ser Gly Ala Gln			
115	120	125	
ctc ggc gag ctc tac tac gcc atc tat aag gcg agc ccc acg ctg gcg		432	
Leu Gly Glu Leu Tyr Tyr Ala Ile Tyr Lys Ala Ser Pro Thr Leu Ala			
130	135	140	
ttc ccg gcc ggc gtg tgc ccg acg atc gga gtg ggc ggc aac ttc gcg		480	
Phe Pro Ala Gly Val Cys Pro Thr Ile Gly Val Gly Gly Asn Phe Ala			
145	150	155	160
ggc ggc ggc ttc ggc atg ctg ctg cgc aag tac ggc atc gcc gcg gag		528	
Gly Gly Phe Gly Met Leu Leu Arg Lys Tyr Gly Ile Ala Ala Glu			
165	170	175	
aac gtc atc gac gtg aag ctc gtc gac gcc aac ggc aag ctg cac gac		576	
Asn Val Ile Asp Val Lys Leu Val Asp Ala Asn Gly Lys Leu His Asp			
180	185	190	
aag aag tcc atg ggc gac gac cat ttc tgg gcc gtc agg ggc ggc ggg		624	
Lys Lys Ser Met Gly Asp Asp His Phe Trp Ala Val Arg Gly Gly Gly			
195	200	205	
ggc gag agc ttc ggc atc gtg gtc gcg tgg cag gtg aag ctc ctg ccg		672	
Gly Glu Ser Phe Gly Ile Val Val Ala Trp Gln Val Lys Leu Leu Pro			
210	215	220	
gtg ccg ccc acc gtg aca ata ttc aag atc tcc aag aca gtg agc gag		720	
Val Pro Pro Thr Val Thr Ile Phe Lys Ile Ser Lys Thr Val Ser Glu			
225	230	235	240
ggc gcc gtg gac atc atc aac aag tgg caa gtg gtc gcg ccg cag ctt		768	
Gly Ala Val Asp Ile Ile Asn Lys Trp Gln Val Val Ala Pro Gln Leu			
245	250	255	
ccc gcc gac ctc atg atc cgc atc atc gcg cag ggg ccc aag gcc acg		816	
Pro Ala Asp Leu Met Ile Arg Ile Ile Ala Gln Gly Pro Lys Ala Thr			
260	265	270	

ttc gag gcc atg tac ctc ggc acc tgc aaa acc acc ctg acg ccg ttg atg Phe Glu Ala Met Tyr Leu Gly Thr Cys Lys Thr Leu Thr Pro Leu Met 275	280	285	864
agc agc aag ttc ccg gag ctc ggc atg aac ccc tcc cac tgc aac gag Ser Ser Lys Phe Pro Glu Leu Gly Met Asn Pro Ser His Cys Asn Glu 290	295	300	912
atg tca tgg atc cag tcc atc ccc ttc gtc cac ctc ggc cac agg gac Met Ser Trp Ile Gln Ser Ile Pro Phe Val His Leu Gly His Arg Asp 305	310	315	960
gcc ctc gag gac gac ctc ctc aac cgg aac aac tcc ttc aag ccc ttc Ala Leu Glu Asp Asp Leu Leu Asn Arg Asn Asn Ser Phe Lys Pro Phe 325	330	335	1008
gcc gaa tac aag tcc gac tac gtc tac cag ccc ttc ccc aag acc acc gtc Ala Glu Tyr Lys Ser Asp Tyr Val Tyr Gln Pro Phe Pro Lys Thr Val 340	345	350	1056
tgg gag cag atc ctc aac acc tgg ctc gtc aag ccc ggc gcc ggg atc Trp Glu Gln Ile Leu Asn Thr Trp Leu Val Lys Pro Gly Ala Gly Ile 355	360	365	1104
atg atc ttc gac ccc tac ggc gcc acc atc agc gcc acc ccg gag tcc Met Ile Phe Asp Pro Tyr Gly Ala Thr Ile Ser Ala Thr Pro Glu Ser 370	375	380	1152
gcc acg ccc ttc cct cac cgc aag ggc gtc ctc ttc aac atc cag tac Ala Thr Pro Phe Pro His Arg Lys Gly Val Leu Phe Asn Ile Gln Tyr 385	390	395	400
gtc aac tac tgg ttc gcc ccg gga gcc gcc gcg ccc ctc tcg tgg Val Asn Tyr Trp Phe Ala Pro Gly Ala Ala Ala Pro Leu Ser Trp 405	410	415	1248
agc aag gac atc tac aac tac atg gag ccc tac gtg agc aag aac ccc Ser Lys Asp Ile Tyr Asn Tyr Met Glu Pro Tyr Val Ser Lys Asn Pro 420	425	430	1296
agg cag gcg tac gca aac tac agg gac atc gac ctc ggc agg aac gag Arg Gln Ala Tyr Ala Asn Tyr Arg Asp Ile Asp Leu Gly Arg Asn Glu 435	440	445	1344
gtg gtc aac gac gtc tcc acc tac gcc agc ggc aag gtc tgg ggc cag Val Val Asn Asp Val Ser Thr Tyr Ala Ser Gly Lys Val Trp Gly Gln 450	455	460	1392
aaa tac ttc aag ggc aac ttc gag agg ctc gcc att acc aag ggc aag Lys Tyr Phe Lys Gly Asn Phe Glu Arg Leu Ala Ile Thr Lys Gly Lys 465	470	475	480
gtc gat cct acc gac tac ttc agg aac gag cag agc atc ccg ccg ctc Val Asp Pro Thr Asp Tyr Phe Arg Asn Glu Gln Ser Ile Pro Pro Leu 485	490	495	1440
			1488

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15		
Lys Glu Ile Pro Pro Arg Leu Leu Tyr Ala Lys Ser Ser Pro Ala Tyr		
20	25	30
Pro Ser Val Leu Gly Gln Thr Ile Arg Asn Ser Arg Trp Ser Ser Pro		
35	40	45
Asp Asn Val Lys Pro Leu Tyr Ile Ile Thr Pro Thr Asn Val Ser His		
50	55	60
Ile Gln Ser Ala Val Val Cys Gly Arg Arg His Ser Val Arg Ile Arg		
65	70	75
80		
Val Arg Ser Gly Gly His Asp Tyr Glu Gly Leu Ser Tyr Arg Ser Leu		
85	90	95
Gln Pro Glu Thr Phe Ala Val Val Asp Leu Asn Lys Met Arg Ala Val		
100	105	110
Trp Val Asp Gly Lys Ala Arg Thr Ala Trp Val Asp Ser Gly Ala Gln		
115	120	125
Leu Gly Glu Leu Tyr Tyr Ala Ile Tyr Lys Ala Ser Pro Thr Leu Ala		
130	135	140
Phe Pro Ala Gly Val Cys Pro Thr Ile Gly Val Gly Gly Asn Phe Ala		
145	150	155
160		
Gly Gly Gly Phe Gly Met Leu Leu Arg Lys Tyr Gly Ile Ala Ala Glu		
165	170	175
Asn Val Ile Asp Val Lys Leu Val Asp Ala Asn Gly Lys Leu His Asp		
180	185	190
Lys Lys Ser Met Gly Asp Asp His Phe Trp Ala Val Arg Gly Gly Gly		
195	200	205
Gly Glu Ser Phe Gly Ile Val Val Ala Trp Gln Val Lys Leu Leu Pro		
210	215	220
Val Pro Pro Thr Val Thr Ile Phe Lys Ile Ser Lys Thr Val Ser Glu		
225	230	235
240		
Gly Ala Val Asp Ile Ile Asn Lys Trp Gln Val Val Ala Pro Gln Leu		
245	250	255

Pro Ala Asp Leu Met Ile Arg Ile Ile Ala Gln Gly Pro Lys Ala Thr
 260 265 270
 Phe Glu Ala Met Tyr Leu Gly Thr Cys Lys Thr Leu Thr Pro Leu Met
 275 280 285
 Ser Ser Lys Phe Pro Glu Leu Gly Met Asn Pro Ser His Cys Asn Glu
 290 295 300
 Met Ser Trp Ile Gln Ser Ile Pro Phe Val His Leu Gly His Arg Asp
 305 310 315 320
 Ala Leu Glu Asp Asp Leu Leu Asn Arg Asn Asn Ser Phe Lys Pro Phe
 325 330 335
 Ala Glu Tyr Lys Ser Asp Tyr Val Tyr Gln Pro Phe Pro Lys Thr Val
 340 345 350
 Trp Glu Gln Ile Leu Asn Thr Trp Leu Val Lys Pro Gly Ala Gly Ile
 355 360 365
 Met Ile Phe Asp Pro Tyr Gly Ala Thr Ile Ser Ala Thr Pro Glu Ser
 370 375 380
 Ala Thr Pro Phe Pro His Arg Lys Gly Val Leu Phe Asn Ile Gln Tyr
 385 390 395 400
 Val Asn Tyr Trp Phe Ala Pro Gly Ala Ala Ala Ala Pro Leu Ser Trp
 405 410 415
 Ser Lys Asp Ile Tyr Asn Tyr Met Glu Pro Tyr Val Ser Lys Asn Pro
 420 425 430
 Arg Gln Ala Tyr Ala Asn Tyr Arg Asp Ile Asp Leu Gly Arg Asn Glu
 435 440 445
 Val Val Asn Asp Val Ser Thr Tyr Ala Ser Gly Lys Val Trp Gly Gln
 450 455 460
 Lys Tyr Phe Lys Gly Asn Phe Glu Arg Leu Ala Ile Thr Lys Gly Lys
 465 470 475 480
 Val Asp Pro Thr Asp Tyr Phe Arg Asn Glu Gln Ser Ile Pro Pro Leu
 485 490 495
 Ile Lys Lys Tyr
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Tyr

<210> 16
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1 5 10

<210> 18
<211> 22
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<400> 18
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1 5 10 15

Gln Leu Tyr Leu Lys Ser
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Val Asp Ala Gln Gly Arg Leu Leu
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<211> 15

<212> PRT

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Ser Ala Thr Pro Pro Thr His Arg Ser Gly Val Leu Phe Asn Ile
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<211> 36

<212> PRT

<213> Cynodon dactylon

<400> 27

Ala Ala Ala Ala Leu Pro Thr Gln Val Thr Arg Asp Ile Tyr Ala Phe
1 5 10 15

Met Thr Pro Tyr Val Ser Lys Asn Pro Arg Gln Ala Tyr Val Asn Tyr
20 25 30

Arg Asp Leu Asp
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1 5 10

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22

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23

<210> 32
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49

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23

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<210> 37
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<212> DNA
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23

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23

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23

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